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Stereotypical movements

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Abstract

A 'stereotypical movement' denotes a movement reproduced in a standardised form.

The term is used in two fields, in movement science and in medical assessments of pathology. The former recognises the occurrence of regular patterns of movement across individuals expressed at regular points in development, such as the pre-reach in early infancy. The latter specifies a pathological form of repetitive movement by one individual symptomatic of, for example, autism. This entry explores the inter-individual use of the term in movement science and touches on ongoing work to better classify and quantify stereotypical movements for better psychophysiological understanding of action development, and possible sensitive measures of them. *Clin Ter 2010; 161(4):?-?*

Key words: *action, movement, pattern*

Introduction

TACT-Glossary (TACT, Thought in Action) was part of a research project financed by the European Union's NEST-Adventure Program. The main aim of TACT was to analyze goal-directed actions that are typically performed by infants, using instrumented toys. The new devices and tools may allow earlier diagnosis of neurodevelopmental disorders with possible therapeutic benefits. We present here and in the successive issues of the journal the entries of the Glossary realized by the Ethical Working Group. These entries have been written by experts in the relevant field with to goal to provide a common conceptual ground, and to avoid ambiguities in the discussions that took place within the project.

Entry: Stereotypical movements

Of a stereotype (from the Greek *stere* meaning 'solid, in three dimensions' and *tupos* meaning 'blow, impression, image, figure') of movement (from the Latin *movere* meaning change the place, position, or posture of or take from

one place, position, or situation to another and -ment as a productive suffix for expressing the result, the product, or means of action) (1). The term has a working definition for research in movement science, and a diagnostic definition based on medical assessments of pathology; the two are not identical, but are closely related.

A stereotype denotes something reproduced in an unchanging and standardised form. In studies on the development of infant movement and adult movements made in specific contexts, there are common, stereotypical forms of movements that are characteristic of that developmental stage or that particular adult act. These movements are reproduced unchanging across individuals and therefore have developmental and phylogenetic aetiology capable of characterising health or pathology, but importantly are patterned processes that can be recognised, measured, and related neurologically to their underpinning neuroinformatic pattern of driving energy.

For example, pre-reaching (2) is a stereotypical movement. It has a characteristic set structure and is repeated by every newborn baby. It likely derives from phylogenetic origins in deep evolution, retaining characteristics of the anteroposterior sweep of the pectoral fins' distal wave during propulsion. Pre-reaching is enacted by an infant dependent on his or her interests and therefore is driven by his psychophysiological state in engagement with his world. The unfolding of the pre-reaching movement is stereotypical across individuals, yet differences from one pre-reach to another express different social contexts and psychological state. The unfolding can be modulated to give individual expressive quality within the domain of action that characterises the movement as a pre-reach.

Stereotyped movements are useful in research to define common movements of a particular quality. For example, the rapid movement of a neonates arm from the flexed position to a fully extended position is stereotypical. The trajectory of the movement traces a path extending ballistically ventrally, ballistically laterally, or with a combination of the two. The characteristic element that defines this particular stereotypical movement is its regular pattern and regular occurrence in all infants. Through improved

resolution of stereotypical movements in research, it may be possible to make numeric boundaries for these characters, and so make useful quantified definitions of healthy movements, to better define those indicative of pathology – the aims of TACT.

In psychology and medicine, stereotypy is used to characterise a pathological condition, denoting ‘an abnormal presence of a fixed or stereotyped idea, action, *etc.*, especially in cases of autism or catatonia’ (3). These stereotypical movements are quite a distinct type and not to be confused with those described above. They are ‘repeated without variation irrespective of circumstances’ and are ‘performed repeatedly, rigidly, often regardless of context, and apparently without purpose’ (4). The diagnostic criteria for autism specifies, “stereotyped and repetitive motor mannerisms (*e.g.* hand or finger flapping or twisting, or complex whole-body movements)” (5). This medical definition is based on intra-individual stereotypy, not the pan-individual stereotypy of our research.

In movement science of the type TACT is contributing to, *stereotypical movements are those that conform to a simplified set type across individuals that can be characteristic of development age, health or pathology.* Their production

can be dependent on and/or modified by psychophysiological status. In other words, they are common, regular patterns of movement that may indicate the psychological and physiological health and state of the individual.

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